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The Misconduct Follies: Wow, What a Conference!

Conferences frequently inspire mutterings of disappointment. But rarely in SGR's long experience has a major gathering evoked such low, even contemptuous ratings, as the solemnly titled Convocation on Scientific Conduct, sponsored by and held at the National Academy of Sciences on June 6 and 7.

For bashing the obvious, paucity of content, and irrelevance to the issue of the moment—ongoing erosion of public confidence in the integrity of science—this one could retire the cup. And it happened as the public and Congress puzzle and rage over reports of fraud and bumbling management in breast-cancer research, currently the most panic-rousing disease.

Symbolic of the Peter Pan mentality that pervades the establishment's approach to scientific misconduct, the breast-cancer debacle was not on the program.

Normally, low-yield meetings of scientists and associated onlookers are too frequent to warrant attention. But this show was an all-too-familiar symptom of the science establishment's underlying skepticism about the seriousness of the misconduct issue. The leadership now accepts that politics and the public must be persuaded that science is determined to police itself. But the basic feeling in the senior ranks is that the issue has been pumped up by opportunistic Congressmen and muddled journalists. And from that perception, the ensuing interest tends more toward public relations than policing.

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Given the influential sponsorship of the proceedings, it is understandable that none of a generous sampling of the attendees queried by SGR would comment for the record. But the confided assessments were uniformly dismal, with several who had attended using "awful" in describing their reactions, and one journalist on a major scientific weekly plaintively asking, as he walked out early, "Why are they doing this?"

Absent from the meeting, an elder statesman prominently involved with the misconduct issue later told SGR, "I heard it was pretty bad." The cheeriest rating came from an on-stage participant, who said he felt the meeting improved after a poor start, and that "five years ago, you would never have the President of the Academy and the IOM [Institute of Medicine] saying misconduct is a major problem."

From 8:30 am to 7 pm on the first day, and 8 am to 12:30 pm on the second, the approximately 250 attendees, drawn from academe, were lectured about the importance of honesty in research, perhaps a telling topic, since most of them were well along in their careers. But the dominant topic concerned tutoring the young against scientific delinquency.

The assemblage was strongly exhorted to educate the coming generation of scientists in ethical purity, the rationale being that contemporary science is bigger and more competitive and impersonal than in prior days, when, according to NAS President Bruce Alberts, ethical understanding was acquired by "osmosis." Left unnoted was that today's most brazen miscreants are senior and high-ranking.

This was pointed out during a question and answer period by Heidi Weissmann, a physician who was once a rising star in nuclear medicine. Weissmann won a court ruling in 1989 against copyright infringement by a former mentor and

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In Brief

The Space Station has survived its first Congressional test of the season, but at heavy cost to NSF. On June 9, the House Appropriations Subcommittee for NASA and NSF approved the $2.1 billion requested for the orbital white elephant. But it cut $131 million from the $350 million increase proposed for NSF, leaving $2.2 billion for research in fiscal 1995. If the numbers remain intact, NSF would be held to a 2.5 percent increase for research, a ground-losing figure on the scale of scientific inflation.

The budget situation is even tighter in the Senate, where the Appropriations Subcommittee for the two agencies was allocated even less money to work with than its House counterpart. While NSF's ingrate beneficiaries in academe have remained silent, the Space Station lobby has been working Capitol Hill and running full-page ads extolling the project and the jobs it finances.

More griping about budget shares, this time from the American Society of Mechanical Engineers, which notes that the 10 percent increase proposed for engineering in NSF's 1995 budget falls short of the 1992 figure, which was 10.1 percent.

Frederick Goodwin, who stepped down in April as Director of the National Institute of Mental Health, has been slowly progressing toward a faculty post in psychiatry at George Washington University. His appointment, still being negotiated last week, will be under the Intergovernmental Personnel Act, which finances temporary assignments between federal and private organizations. Goodwin told SGR he'll try it for two years. In 1992, he was forced to resign as head of the Alcohol, Drug Abuse, and Mental Health Administration after publicly suggesting that primate research might shed light on inner-city violence.

. . . NIH Director Deems Misconduct "a Real Issue"

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colleague and recently a $900,000 settlement in her employment discrimination suit against Yeshiva University's Albert Einstein Medical School. Weissmann noted that she lost her job while her officially certified oppressor got a promotion. "The students get the message," Weissmann said, "that misconduct is okay if you're high up enough."

The Convocation, of course, should have mined her long and painful hands-on experiences with the misconduct system in action, but she was merely a member of the audience, not a scheduled speaker. Weissmann's comments seemed to embarrass the assemblage, which quickly passed on to other matters.

At a nickel per cliche, the proceedings could have turned into a successful fund-raiser, starting with the keynote address by Academy President Alberts, who said, "It goes without saying that we need to do what we can to discourage scientific misconduct." Though studded with unexceptionable homilies, Alberts' address actually represented an ideological step away from the complacency that has characterized the establishment's attitude toward larceny and other delinquencies in science.

The Academy President, just short of one year in office, declared that science should aim higher than mere compliance with the law, a theme stated last February when he and other NAS officers announced plans for the Convocation.

Then came the Chairman of the Convocation Steering Committee, Gerald Fischbach, Chairman of the Department of Neurobiology at Harvard Medical School. Though the low incidence of misdeeds indicates that "science is as good as Ivory soap," he said, any misconduct is too much, adding that the Convocation would address the topics of the "role of education" and "consciousness raising."

And so the meeting was off and running, with individual addresses and small-group sessions interspersed with big-cast productions of 20 or more persons seated on stage to comment and quip about the topic of the day. At one session, considerable time was devoted to criteria for authorship listings and the order in which authors should be listed.

At another, a professor from the University of Pittsburgh declaimed that "the most important instruction is by example." Asked by SGR during a break whether his institution was making use of its current immersion in misconduct investigations to tutor its young, let alone Pitt's many past enrichments of the annals of misconduct, he nodded in the negative, mumbling something about the probes of breast-cancer research extending to far away research centers.

Asked to be brief as a question-and-answer period approached closing time, one of the more voluble attendees explained that, in response to the request to be brief, he would be brief, and proceeded to state, "I wish to discuss three points," which he did at some length, for no evident gain in understanding.

On the second day of the meeting, commencing at 8 am, Harold Varmus, Director of the National Institutes of Health, confessed to a conversion, telling the audience, "My own attitude has shifted considerably from the time when I would have said that science is simply self-correcting—leave us alone—to the present, when we all recognize that scientific misconduct, fraud, is a real issue that deserves the kind of attention it's getting..."

Varmus alluded to the nastiest political problem on his agenda at the moment, the breast-cancer trials administered by the University of Pittsburgh. But beyond asking the assemblage for suggestions on how to punish scientific misdeeds, he dealt only briefly with the highly publicized, if exaggerated, problems at Pittsburgh. Indicative of the confusion that reigns in NIH's dealings with the misconduct issue, Varmus told the audience, "We look to you for guidance in handling clinical research." He also solicited counsel on "how to raise consciousness" on the issue.

Varmus did not discuss the role of the sulfurous Congressman John Dingell in his shift of attitude, but he did provide a rare bit of levity, grounded in fact, for the dour proceedings. Ranging over the topic of the day, he noted "an old saw that doctors who are convicted of misconduct in science end up practicing medicine and doctors who are accused of malpractice, end up doing research."

Varmus was followed at the lectern by Neal Lane, Director of the National Science Foundation, where an efficiently run Office of the Inspector General has avoided the marathon ineptitudes that have plagued NIH and its parent Department of Health and Human Services in dealing with misconduct. Speaking thus from a position of confidence, Lane did not wallow in the uncertainties of the issues, though he did politely invite the Convocation to refine the definitions of misconduct and suggest additional ways of spreading the gospel of integrity.

The Convocation had its genesis in a dissension-filled study conducted by the Academy, which resulted in a mangled report, *Responsible Science: Ensuring the Integrity of the Research Process*, issued in 1992, at a cost of $888,000, which doesn't buy much at the high-overhead Academy. Chaired by Edward E. David Jr., a veteran of the Washington

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Editor and Publisher **Daniel S. Greenberg**
Associate Publisher **Wanda J. Reif**
Circulation Manager **Glen D. Grant**

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. . . 1992 Misconduct Report Revealed Split at NAS

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science-advisory system, the 22-member Panel on Scientific Responsibility and the Conduct of Research was riddled with disagreement about whether misconduct constituted a real problem for science and, if so, how to respond to it. The result was a pabulum production, which stated that "the existing self-regulatory system in science is sound. But modifications are necessary to foster integrity in a changing research environment, to handle cases of misconduct in science, and to discourage questionable research practices."

Having pondered the issues off and on for two years, the Panel might have been expected, at a minimum, to hint at desirable modifications. But the deliberators tiptoed away with a frail explanation: "The Panel did not have a base of sufficient institutional experience or consensus about these matters within the academic community to develop recommendations about the nature of institutional procedures for handling allegations of misconduct in science."

Even this weaseling cop-out was too strong for two members of the Panel, Howard K. Schachman, UC Berkeley, and Keith Yamamoto, UC San Francisco, who appended a "minority statement" declaring that the report "fails to convey the overriding importance of intellectual freedom."

Schachman is in the vanguard of misconduct skeptics. A great buddy of Harold Varmus, Schachman serves on a parttime basis as roving ombudsman for the NIH chief. Schachman's good faith is not to be doubted. His intransigence, however, epitomizes the old-guard mentality that causes politicians to regard science as a self-protective league hostile to accountability for public funds.

Chairman David of the Academy Panel personally pushed for creation of an independent, though vaguely defined, Scientific Integrity Advisory Board to "exercise leadership" in dealing with scientific misconduct. But the proposal evoked no interest in Washington science-policy circles, and David turned to other interests. He did not attend the June 6-7 Convocation, because, he told SGR, of prior commitments

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Howard Schachman: Roving Biomedical Ombudsman

"Varmus told me, 'Schachman, find out what's wrong with the program.' " That's how Howard Schachman, a feisty, puckish 75-year-old Professor at UC Berkeley, explains his appointment as what is generally referred to as the ombudsman of the National Institutes of Health.

With the proper title of Expert Advisor to NIH Director Harold Varmus, an old friend and colleague, Schachman occupies a unique and influential role in the inner politics of biomedical research: roving the national biomedical landscape and reporting back to Varmus, who prefers Bethesda to air travel.

Schachman, who was President of the Federation of American Societies for Experimental Biology in 1989, is renowned as an unalloyed champion of the scientist at the bench, ever on guard against fraud-hunting vigilantes and money-hungry administrators seeking bigger slices of research funds for overhead charges.

While Varmus has moved his Nobel-prize winning lab from UC San Francisco to the NIH campus, roving ombudsman Schachman remains deeply involved in research of his own back at Berkeley, where he is the principal investigator on a five-year, $350,000-a-year merit award from NIH and a three-year, $90,000-a-year grant from the National Science Foundation. Schachman says that his support from the two agencies, for research on the functions, structure, and interactions of macromolecules, began decades ago and has been regularly renewed.

The ombudsman assignment calls for serving 130 days a year—"just like Lloyd Cutler," Schachman cheerily told SGR last week, referring to the establishment Washington lawyer summoned by Clinton to head the crisis-ridden White House Counsel's Office.

Since early this year, Schachman says, he has visited a number of research centers, including the University of Texas at Dallas and Houston, Baylor University, M.D. Anderson, the University of Oregon, Oregon State, Johns Hopkins, and Massachusetts General Hospital.

His style of operation, he explains, is to contact an acquaintance at the institution (he has one or more everywhere, he says), and set in motion plans for a visit, usually for a day and a half. The Schachman format calls for meetings, with no more than four at time, with graduate students, postdocs, professors at various levels, deans, and administrators. He said he started out taking notes, but now asks the institutions to provide a scribe.

Schachman says: "I tell disappointed grantees that I don't deal with cases and I don't deal with individual grievances. I do group grievances."

So far, the most frequently raised subjects, he says, concern the peer-review system, funding shortages, lengths of applications, and related matters. He found interest in a two-level funding system, based on the track-record for established researchers and the promise of beginners.

Schachman left early in June for a month of research in Germany. In September, he plans to move to NIH for several months to "attend study sections and meet with the staff." He will also take part in a senior-staff retreat planned by Varmus.

Back at Berkeley, Schachman's professorial status was recently solidified with settlement of an age-discimination suit that retitled him from Professor-emeritus to Professor in the Graduate School.

. . . Conference Conceived in Wake of Gallo Case

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in his consulting work.

With the publication of the 1992 Academy report, the establishment, in effect, declared the misconduct issue under satisfactory control. But as far as basic research was concerned, this was true only at the National Science Foundation, where the Inspector General runs an operation that is widely considered swift and fair for accused, accusers, and the government.

This is not the case, however, in misdeeds involving NIH grantees and employes, who come under the authority of the Office of Research Integrity (ORI), in the Department of Health and Human Services. ORI and its predecessor organization, the Office of Scientific Integrity, have stumbled from one calamity to the next. Late in 1992, ORI threw in the towel in the long-festering Gallo case, after issuing two findings of scientific misconduct arising from AIDS research by the renowned virologist. Though not disavowing its well-documented findings against Gallo, ORI felt it could not meet the evidentiary standards imposed by a new participant in the misconduct process, the HHS Departmental Appeals Board.

Two months later, the Academy announced plans for the Convocation in a statement carefully worked over by NAS President Alberts and Kenneth Shine, President of the Institute of Medicine. Without mentioning Gallo or related events, the announcement stated: "As members of the professional research community, we should strive to develop and uphold standards that are broader than those addressed by the governmental regulatory and legal framework for dealing with misconduct in science."

At the time, an Academy staff member told SGR that the Gallo case "was in the air" when the statement was drafted. He added that "Gallo said he was exonerated when others felt he got off by a technicality."

Noting prior Academy reports on dealing with scientific misconduct, the NAS announcement expressed "concern that many recommendations included in these reports have not been implemented," adding that misconduct "threatens to weaken the high ethical standards that characterize the research enterprise" and "reduce society's confidence in science and scientists."

But after the strong rhetoric, it was downhill, starting with basic meeting arrangements. Though plans to hold the Convocation were announced in February, the initially announced dates in May were ditched when the hoped-for participants could not be lined up. After the final date was set, according to one speaker, numerous changes in schedule, topics, and focus were made until shortly before the opening session.

But the fundamental problem was that the Convocation did not proceed from the conviction that science faces a gruesome problem of public and political doubt about its integrity. Doubters should ponder a public-opinion survey, sponsored by the Chicago Academy of Sciences, reported in *Science & Engineering Indicators 1993*, published by the National Science Board, NSF's policymaking body.

Survey statement: "Many scientists make up or falsify research results to advance their careers."

In agreement, 52 percent of all adults surveyed. Among those with college degrees, 38 percent agreed with the statement, as did 38 percent with graduate and professional degrees.

There's still time for the science establishment to get with it, and therefore SGR volunteers, gratis, a selection of topics for the next pow-wow:

"A Short History of the Gallo Case: Wherein a Researcher Remains Director of a Major Laboratory at NIH After Government Authorities and Many of His Peers Find Him Guilty of Scientific Misconduct."

"Why and How NSF's Misconduct Procedures Work Efficiently."

"From Here to Eternity: How the Office of Research Integrity Responds to Misconduct Allegations."

"Why We Don't Trust You." (Invited speaker, Rep. John Dingell.)—DSG

Funding Drop in Federal R&D

The government's latest estimates for fiscal 1994, which runs to September 30, say federal R&D obligations for the year will total $74 billion, a one-year drop of 1 percent, mainly attributed to a 17-percent decline in funds for laboratory construction and facilities and a 2-percent drop in development funding. Money for applied and basic research—bunched together in the report—will rise by 2 percent, not enough to keep up with inflation.

The figures, compiled by Ronald L. Weeks at NSF, show defense R&D spending at 51 percent of all federal R&D spending. In 1990, the Pentagon's share stood at 57 percent, but after a rapid drop, funding has leveled off.

Virtually all disciplines gained support in recent years, the reports states. The sole loser was psychology, which "is expected to be the only one of the eight major fields of science and engineering ... that will show a decline in growth (5 percent in current dollars and 7 percent in constant dollars) between FY 1990 and FY 1994." With $346 million in funding for FY 1994, down from $449 in 1990, psychology trailed the entire field.

At the top were the life sciences, up from $8.8 billion in 1990 to $11.3 billion in 1994. Engineering was second, rising from $4.3 billion to $6 billion, and the physical sciences were third, with $3.8 billion in 1990 and $4.8 billion in 1994. The numbers are subject to revision, but usually come very close to the final version.

Copies of the report, "Federal Funding for R&D and for R&D Plant Expected to Decrease in FY 1994," are available without charge from: NSF, Division of Science Resources Studies, Suite 965, Arlington, Va. 22230; tel. 703/306-1773.

Clinton's Science Council: Too Busy to Meet

The National Science and Technology Council has never once met since its creation was announced by the White House last November. But in the meantime, its nominal membership, drawn from the highest ranks of government, has swelled from the original 14 to 23, making it perhaps the fastest-growing phantom on the Washington committee scene.

When the Council was first announced, the membership consisted of the President, Vice President, the White House Budget chief and Science Advisor and a handful of Cabinet secretaries and agency heads with major R&D responsibilities—14 in all. Its stated function was to serve as a central meeting ground for virtually all government R&D activities, thus enhancing coordination and other worthy and ever-elusive goals. In terms of bureaucratic evolution, the Council was designed as a bigger and more authoritative version of the Bush-era Federal Coordinating Council for Science, Engineering, and Technology (FCCSET).

Prestige and clout were assured by the role of the President himself as Council Chairman, an upgrade from FCCSET, which was headed by Bush's Science Advisor. Staff support was assigned to the White House Office of Science and Technology Policy, which raised OSTP in the Washington pecking order.

The November announcement raised expectations of a great powerhouse in federal science affairs [at least SGR's expectations: December 1, "Science, Technology Council Established by Clinton]. But nothing much has happened, then or since, that can be attributed to the existence of the Council, except for enlargement of its membership.

Inexplicably absent from the membership roll was the Secretary of Agriculture, though he presides over a far bigger research budget than the head of the Environmental Protection Agency, who was included. Absent, too, was the Director of the $10-billion-a-year National Institutes of Health, though included was the Director of the $3-billion-a-year National Science Foundation. The explanation regarding NIH was that, big as it is, it is submerged in the Department of Health and Human Services, whose Secretary serves on the Council.

Correctives were soon on the way, with memberships for the Secretary of Agriculture and the head of NIH. Since then, slots have been awarded to the head of the CIA and the Presidential assistants for National Security, Economic Policy, and Domestic Affairs, plus the Chairman of the Council of Economic Advisors, the Secretary of Transportation, and a few others.

The lack of a meeting during the seven months since the establishment of the Council is attributed to the difficulty of rounding up the eminences who constitute its membership. Several attempts in the past were abandoned when the appointed time drew a pile of negative RSVPs. In recent weeks, however, the White House Science Office has resonated with hopeful expectations of a late-June meeting of the Council, with the President in the chair.

Meanwhile, a flock of "coordinating committees" under the Council's mantle have been at work, though they probably could function just as well without the existence of the Council. Prominent among them is the one responsible for Fundamental Science and Engineering Research, co-chaired by the heads of NIH and NSF, with M.R.C. Greenwood, Associate Director for Science in the White House Science Office, at its helm. A frequent speaker at meetings of science organizations in Washington and elsewhere, Greenwood serves as the Administration's emissary to the science establishment, and was the organizer of the Forum on Science in the National Interest: World Leadership in Science, Mathematics, and Engineering, last January at the National Academy of Sciences.

She invariably receives good notices for her sympathetic reception of gripes and recommendations, though, with research budgets taking a beating at the White House and on Capitol Hill, beneficial effects elude detection.

The November announcement of the Council's creation was accompanied by word that the Clinton Administration would appoint a standing group of non-government scientists to advise the President. With a slight alteration of the title used by the Bush White House, this would be the President's Committee of Advisors on Science and Technology (PCAST), with approximately 15 members in the Clinton Administration's version.

However, there's still no PCAST, though the White House Science Office has confidently insisted over the past couple of months that it could be coming along any day now.

The difficulty of lining up 15 or so people to serve on a part-time Presidential Council is attributed to various causes. One source tells SGR that the main problem has been failure of several appointees to complete the voluminous paperwork that accompanies Presidential appointments, high or low. Another explanation is that filling of the PCAST roster was slowed by a quest for diversity in sex, ethnicity, geography, professional discipline, etc.

It's not like back in the old days, when the White House swiftly recruited its science advisors from the physics and chemistry departments in Cambridge, Mass., and the University of California.

But after 18 months of snail-paced progress in the Clinton Administration's appointments, questions are turning from "What's the matter with these guys?" to less-charitable inquiries.

In Quotes: Science Must Face up to Political Change

With warnings of post-Cold War upheavals in the support and organization of science, Edward E. David, Jr., remains the leading prophet of change in the scientific enterprise, including predictions of massive reductions in funding and tighter controls over research. White House Science Advisor in the Nixon Administration, later a corporate R&D executive, and now a consultant, David has been vindicated in many of his forecasts since he first uttered them in 1992 [SGR, October 15, 1992: "Science Faces Gloomy Times, A Veteran Insider Warns."] The latest edition of the future according to David, no cheerier than before, appears in the Spring issue of the National Academy of Engineering quarterly, The Bridge, *from which the following is excerpted.*

•

The peacetime economy that we are inheriting simply does not absorb new knowledge and its products as the old Cold War economy did. There is not the survival instinct that so animated defense research people to ignore risk and reach out into the unknown. Their philosophy permeated far beyond the purely defense sector into nearly all activities, some not even involving science or technology.

The United States has not had a peacetime economy in 55 years. Our expectations for insatiable demand for science may be much too great. Demands for scientific advances are likely to stem from clearly perceived needs rather than the opportunities for new science—the SSC cancellation is a warning sign....

There are other arguments for goal orientation as well. These tend to focus on presumed or declared crises on the social front.... Witness the recent green-automobile summit in Washington. Note that it is goal-oriented and any necessary research remains to be formulated, let alone executed. Scientists and research engineers should be thinking about how to respond to such demands. We need to ask what new or modified paradigm for scientific research can preserve investigator initiative while satisfying the public demands for solutions to specific problems....

The currently fashionable R&D paradigm [in corporate research] is a team approach aimed at realizing specific products and services. Teams are made up of all necessary specialists, from research through marketing and distribution... Teaming shortens lead time, but the emphasis is on *incremental*, not revolutionary, improvements in products and processes.

Corporate research labs are viewed as anachronisms, isolated from the critical activities of the corporation. They are seen as expensive and unresponsive. Downsizing has been progressing for some time. Corporations are increasingly lean, mean, and *stupid*—oriented toward "results," not understanding of fundamentals.

This trend raises the question. How will new science and technologies be generated? There are several possibilities, none guaranteed effective. One is increased federal funding of so-called pre-competitive research. The NSF-NIH-NIST-ARPA-National Labs coalition aims in this direction. The recently announced green-automobile initiative is not an example despite use of the term "precompetitive."

Another possibility is opening of "windows on technology" through venture capital activities. Still another is further expansion of the SBIR [Small Business Innovation Research] program. But none of these is pointed at true fundamental, investigator-initiated research. That means academia will remain the prime source of such research....

To be effective, science must be integrated into an overall plan of corporate or national action, but leaving room for investigator-initiated research. Cooperative research consortia such as the Microelectronics and Computer Technology Corporation (MCC) and the Electric Power Research Institute (EPRI) show how difficult this balancing act can be. Nevertheless, the basic idea of investigator-initiated research within a broad mission or field is appealing.

But that field or mission must have promise—no perpetual-motion machines or other fringe ideas based on the fancy of Congressional or public-interest groups....

In proposing what should be done, it is essential to recognize that most public and private funders have a different view of science than do scientists and sophisticates. We as scientists and engineers tend to look on science as mankind's best link to reality and as a rational approach to structuring governance, societal institutions, and public affairs. In contrast, the public, its representatives, and funders tend to look on science pragmatically as a tool for societal well-being and for solving the problems of the day. One of these views leads to self-governance of science, the other to slaving science to public or private goals.

What should be done? Let me point out a possible starting point. The current definition of basic scientific research is based on the motivations of the researcher. This definition, long held, has caused major damage to the utilization of science and has often poisoned relations between academia and political and public interests, as well as industry.

A first step, which would be welcomed by the Congress and industrial leaders, and would herald a new attitude by researchers, would be to rewrite the definition as follows: Basic research aims to create new knowledge for archives and applications. Thus, the new definition would be based on the content and methodology of the work, not the motivations of the researcher or the funder....

A next step would be to move increasingly to contracts for academic research. This change does not have to be precipitous. Again, such a transition would be seen as evidence of concern by researchers for productive effort....

These and subsequent steps may be distasteful to academic people. But, I believe that such steps would not change the substance of research significantly in most cases. However, evidence of concern by researchers for the judgements of political and industrial leaders is essential if research people are to control their own research agendas.

In Print

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and administrative *laissez-faire* in orchestrating research prevail at the US Department of Transportation (DOT), where the Federal Aviation Administration and seven other "operating administrations" doled out at least $190 million in new R&D awards from 1991-93 to the 141 universities that responded to the GAO's inquiry; DOT itself couldn't provide a reckoning, according to the report. "DOT's planning for university research activities is diverse and fragmented and is not pursued through an integrated plan," the GAO concludes.

It also notes that DOT research funds earmarked by Congress rose from $12.6 million in 1991 to $95.6 million in 1993. The academic recipients are listed in an appendix.

Also from the GAO: ***Aviation Security: Development of New Security Technology Has Not Met Expectations*** (GAO/RCED-94-142; 59 pp., no charge), reports little progress by the Federal Aviation Administration (FAA) in developing and deploying higher-sensitivity devices and other security measures for detecting explosives and in efforts at boosting aircraft survivability from onboard explosions. In addition, the report states, "FAA does not have a strategy that articulates important milestones, sets realistic expectations, and identifies resources for implementing new explosive detection technology." As reported by the GAO, the FAA said it's working on the problems cited. The report also stated that the "FAA expects that any mandate to use new devices that are not funded by the government will meet stiff resistance from airlines."

Technology Transfer: Improving the Use of Cooperative R&D Agreements at DOE's Contractor-Operated Laboratories (GAO/RCED-94-91; 16 pp., no charge), in response to Congressional puzzlement over the slow pace of industrial deals by the Department of Energy labs in comparison with those of the Army and the National Institute of Standards and Technology. GAO reports that, in characteristic fashion, the DOE approval system in 1991-92 was dominated by headquarters and "strict selection criteria that directed most agreements to predetermined research objectives." The Army and NIST were credited with greater flexibility and lower-level decision-making. DOE is loosening up, the report says, and has adopted "a simplified model cooperative R&D agreement," with greater authority at the local level.

Order from: USGAO, PO Box 6015, Gaithersburg, Md. 20884-6015; tel. 202/512-6000; fax 301/258-4066.

Scientific and Technical Organizations and Agencies Directory (two volumes, 2618 pp., $195), third edition of a world-spanning directory that provides basic information on over 26,500 research centers, administrative and policymaking bodies, libraries, and other organizations, national and international, concerned with the physical sciences, engineering, and technology. Entries for research facilities include title of the organization, address, phone numbers, name of the director, research program and specialized equipment, funding sources, publications, etc. The coverage is unusually thorough, extending to US state academies of science, science attaches at embassies in the US, consulting firms, and philanthropic organizations.

Order from: Gale Research, 835 Penobscot Building, Detroit, Michigan 48226; tel. 1-800/877-GALE and 313/961-2242; fax 1-800/414-5043 and 313/961-6083.

Chemical Heritage (28 pp., twice a year; no charge in the US; $25 overseas), from the Chemical Heritage Foundation, a joint endeavor of the American Chemical Society and the Institute of Chemical Engineers, reports on research in the history of chemistry, grants and awards for scholarship, book reviews, meetings, etc. The publication, in newsletter format, reports it has 22,000 subscribers.

Order from: Chemical Heritage Foundation, Subscriptions, 3401 Walnut St., Philadelphia, Pa. 19104-6228; tel. 215/898-4896; fax 215/898-3327.

Food Components to Enhance Performance: An Evaluation of Potential Performance-Enhancing Food Components for Operational Rations (66 pp., $45, plus $4 for shipping), from the National Academy of Sciences Committee on Military Nutrition Research, a call for additional research on half-a-dozen food components that the Army thinks or hopes might soup up individual performance, mental and physical: tyrosine, choline, carbohydrates, caffeine, carnitine, and structured lipids. The committee, chaired by Robert O. Nesheim, a nutritionist in Salinas, Calif., also looked at glucose, citing "tantalizing hints" that it "has some potential to improve memory and performance on cognition-based tasks."

Order from: National Academy Press, 2101 Constitution Ave. NW, Washington, DC 20418; Lockbox 285, Washington, DC 20055; tel. 1-800/624-6242; in the Washington, DC, area: 202/334-3313.

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In Print

Official reports and other publications of special interest to the research community

(Copies of publications listed here are available from the indicated sources—not from SGR)

Export Controls and Nonproliferation Policy (GPO Stock No. 052-003-01371-1; 82 pp., $5.50), latest in a series from the Congressional Office of Technology Assessment (OTA) on the difficulties of promoting high-tech exports while blocking sales that might help rogue nations develop mass-killing weapons—nuclear, chemical, and biological. OTA recommends deeper study of the technological aspects of weapons development and closer coordination among federal agencies. But it warns that export controls can only delay, not block a government bent on foiling US preferences. Gerald L. Epstein of the OTA staff was Project Director for the report.

Previous publications in the OTA series, all available:

Proliferation of Weapons of Mass Destruction: Assessing the Risk (1993; GPO Stock No. 052-003-01335-5; 123 pp., $7);

The Chemical Weapons Convention: Effects on the US Chemical Industry (1993; GPO Stock No. 052-003-01331-2; 69 pp., $4.75);

Technologies Underlying Weapons of Mass Destruction (1994; GPO Stock No. 052-003-01361-4; 263 pp., $15).

Order from: New Orders, Superintendent of Documents, USGPO, PO Box 371954, Pittsburgh, Pa. 15250-7954; tel. 202/783-3238; fax 202/512-2250 (VISA and MasterCard accepted).

Two more from OTA, available directly from: OTA, US Congress; attn. Ted Williams, Washington, DC 20510-8025; tel. 202/224-8996; fax 202/228-6098.

Energy Efficiency in Federal Facilities: Update on Funding and Potential Savings (OTA-BP-ETI-125; 18 pp., no charge), says federal agencies have substantially reduced their energy consumption, but further cuts are hampered by lack of funds for conservation. Not mentioned is that many federal buildings in the Washington area are ablaze with lights long after the end of the workday.

Understanding Estimates of National Health Expenditures Under Health Reform (OTA-H-594; 20 pp., no charge), a summary of a forthcoming report (expected in July), evaluating the methods employed by the Congressional Budget Office, private consultants, etc., in estimating the financial effects of various health-reform proposals. In the realm of high-vacuum studies, this one's Olympian, stating, for example, that "overall, OTA found that very few of the analyses it reviewed used assumptions that were completely contrary to the results of available empirical research, especially in terms of the direction of an effect.... However, in many cases, the evidence could also support alternative assumptions about the size of the effect (e.g., how many people will join HMOs)." The *Expenditures* report is a followup to a 1993 OTA publication: ***An Inconsistent Picture: A Compilation of Analyses of Economic Impacts of Competing Approaches to Health Care Reform by Experts and Stakeholders*** (GPO Stock No. 052-003-01327-4; 144 pp., $8), available from the USGPO address above.

Physics in the High Schools II (86 pp., no charge), from the American Institute of Physics, more gloomy findings on secondary school physics, with no reason to believe things have improved since the survey data presented here were collected in 1989 and 1990. The authors, Michael Neuschatz and Lori Alpert, state that despite stiffer science requirements in most states following publication of the celebrated *Nation at Risk* in 1983, students who took physics remained stuck at about 21 percent of enrollments and achievements remained low. In contrast to the 1988 edition of *Physics in the High Schools*, which deplored instructional quality, this one deflects doubts about the teachers, stating that virtually all have taken one college-or graduate-level course in physics. Recalling the Bush Administration's goal of America No. 1 in science education by 2000, the authors rule out a chance for physics. SGR was told that the torpid pace of getting the report into print was due to the complexity of the data and disruptions from AIP's move last year from New York to College Park, Md. Still to come, from the American Chemical Society: *Chemistry in the Schools*, based on data collected by the AIP in conducting the physics survey.

Order from: American Institute of Physics, One Physics Ellipse, College Park, Md. 20740; attn. Michael Neuschatz; tel. 301/209-3077; fax 301/209-0843.

Gaining the Competitive Edge: Critical Issues in Science and Engineering Technician Education (NSF 94-32; 46 pp., no charge), report of a July 1993 workshop responding to a major domestic theme of the Clinton Administration—upgrading the technical skills of the large proportion of the workforce that does not complete or even attend four-year colleges. Attendees consisted of 115 technicians, educators, government officials, and industrial representatives. Recommendations focused on curriculum, accreditation, professional recognition, work-study programs, etc. The workshop was co-sponsored by the National Science Foundation's Division of Undergraduate Education and the Federal Coordinating Council for Science, Engineering, and Technology. Co-chairs for the meeting: Timothy Collins, Manager, BS/Technician Recruiting, Proctor & Gamble Co.; Vernon O. Crawley, President, Moraine Valley Community College, Palos Hills, Illinois; Don K. Gentry, Dean, School of Technology, Purdue University.

Order from: National Science Foundation, Division of Undergraduate Education, Room 835, Arlington, Va. 22230; tel. 703/306-1670; fax 703/306-0445.

Department of Transportation: University Research Activities Need Greater Oversight (GAO/RCED-94-175; 45 pp., no charge), from the General Accounting Office, investigative agency for the Congress, says that fairly big money

(Continued on Page 7)